

***Gastrodia umbrosa* B.Gray (Orchidaceae, Gastrodieae):
A new mycoheterotrophic orchid endemic to the
Atherton Tableland, Queensland, Australia**

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Summary

B.Gray & Y.W.Low (2017). *Gastrodia umbrosa* B.Gray (Orchidaceae, Gastrodieae): A new mycoheterotrophic orchid endemic to the Atherton Tableland, Queensland, Australia. *Austrobaileya* **10(1): 86–92**. *Gastrodia umbrosa* B.Gray, a new mycoheterotrophic orchid is described and illustrated. It was recently discovered from the submontane rainforest of the Atherton Tableland in north Queensland. *Gastrodia umbrosa* is morphologically similar to *G. queenslandica* Dockrill but differs in having dark purplish brown flowers with tepals fused for almost the entire length as opposed to brownish orange flowers and tepals fused for two-thirds the length. A taxonomic key to tropical Queensland *Gastrodia* species is provided.

Key Words: Orchidaceae, *Gastrodia*, *Gastrodia umbrosa*, Australia flora, Queensland flora, new species, taxonomy, identification key

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Introduction

Gastrodia R.Br. is a genus of about 70 species of achlorophyllous, mycoheterotrophic terrestrial orchids distributed from tropical Africa through to Asia, Australia and New Zealand (Cribb *et al.* 2010; Govaerts *et al.* 2017). The genus is typified by *G. sesamoides* R.Br., a native of Australia and New Zealand where it is popularly known as the Potato Orchid (Brown 1810; Jones 2006). A comprehensive revision of the genus is still lacking (Pridgeon *et al.* 2005), and for the past few years many new taxa have been discovered and named, e.g., China (Hu *et al.* 2014), Japan (Suetsugu 2014, 2016), Madagascar (Martos *et al.* 2015), New Zealand (Lehnebach *et al.* 2016), the Philippines (Pelser *et al.* 2016) and Solomon Islands (Hsu *et al.* 2016).

In 2004, *Demorchis* D.L.Jones & M.A.Clem., a segregate genus from *Gastrodia* was established to accommodate two taxa, namely *G. papuana* Schltr. and *G. queenslandica* Dockrill that have (1) presence

of filamentous roots that emerge from the apex of the rhizome, (2) short inflated flowers, (3) thick fleshy sepals, and (4) thick and longer peduncle and pedicel at fruiting stage (Jones & Clements 2004). The distinction of these two genera were purportedly supported by a phylogeny inferred from molecular research using only the internal transcribed spacer (ITS) region of the nuclear ribosomal DNA. However, this genus is considered to be a synonym by Merckx *et al.* (2012) and Govaerts *et al.* (2017). As *Gastrodia* is not monographed, we wish to adopt the stance of Pridgeon *et al.* (2005), Merckx *et al.* (2012) and Govaerts *et al.* (2017) in this paper and continue to accept *Gastrodia* as a broadly circumscribed genus while awaiting further molecular phylogenetic resolution that may appear with a more comprehensive taxon sampling and markers.

In Australia, 10 species of *Gastrodia* have been enumerated, but only three species are recorded for tropical Queensland, namely *Gastrodia crebriflora* D.L.Jones, *G. queenslandica* Dockrill and *G. urceolata* D.L.Jones (Dockrill 1992; Jones 2006;

Jones *et al.* 2010). A recent collection from Baldy Mountain Forest Reserve, Atherton Tableland, represents a fourth taxon previously unrecorded and distinct in floral morphological characteristics from all known tropical *Gastrodia* taxa recorded for Queensland and Australia. This taxon is morphologically similar to *G. queenslandica* but differs in having dark purplish brown flowers with tepals fused for almost the entire length whereas *G. queenslandica* has brownish orange flowers with tepals fused for two-thirds of the length. Hence, the species

is new and described here as *Gastrodia umbrosa*.

Materials and methods

Conventional methods of herbarium taxonomy were applied for this study including examination of living plants in the field and preserved spirit collections deposited in BRI and CNS (herbarium acronym follow Thiers (continuously updated)). Measurements were taken from spirit materials, namely Gray *et al.* BG9771 (BRI, CNS) and Gray BG9772 (CNS).

Key to tropical Queensland *Gastrodia*

- 1 Inflorescences 20–150 cm high; flowers bell-like (tepals spreading at the apex), white to pale creamy brown (generally occurring in open forest) **2**
1. Inflorescences < 12 cm high; flowers tubular (tepals not spreading at the apex), brownish orange to dark brown or dark purplish brown (generally occurring in dense rainforest) **3**
- 2 Inflorescence 20–150 cm high; flowers 10–50, obliquely erect; labellum 10–12 × 3–5 mm; callus with three yellow ridges fusing into a single ridge **G. urceolata**
2. Inflorescence 50–100 cm high; flowers 10–35, pendulous; labellum 12.5–14 × 7–8 mm, callus of two primary ridges **G. crebriflora**
- 3 Inflorescence 2–8 cm high; flowers 1–2(3), horizontal to slightly nodding, brownish orange, 8–12 mm long; tepals fused for c. ⅔ of the entire length **G. queenslandica**
3. Inflorescence 4–12 cm high; flowers 1–4, horizontal, dark purplish brown, 10–12 mm long; tepals fused for almost the entire length. **G. umbrosa**

Taxonomy

Gastrodia umbrosa B.Gray, **sp. nov.** Similar to *G. queenslandica* Dockrill but differs in having dark purplish brown flowers with tepals fused for almost the entire length (versus brownish orange flowers with tepals fused for two-thirds of the length). **Typus:** Queensland: COOK DISTRICT: Atherton, Baldy Mountain Forest Reserve, 14 February 2017, B. Gray, T. Hawkes, T. de Groot, W. Cooper, R. Jensen & B. Hyland BG9771 (holo: BRI; iso: CNS).

Plant a glabrous, leafless, achlorophyllous herb. **Rhizome** subterranean, fleshy, creamy-brown 25–60 × 4–8 mm. **Stem** erect, 30–50 mm tall, glabrous, pale brown to cream, with 3–6 clasping scale leaves. **Scale leaves** 4–6 mm long, acuminate. **Inflorescence** 15–22 mm long, with (1–)2–5 flowers; rachis 8–12 mm long; floral bracts lanceolate, 3–6 × 2.5 mm, acute. **Pedicel** slender, twisted, 6–10 mm long. **Flowers** tubular, opening only narrowly at the apex, dark reddish brown to deep blackish brown but slightly paler at the apex; labellum green, visible only in open flowers, emerald green at the apex. **Dorsal sepal** fleshy,

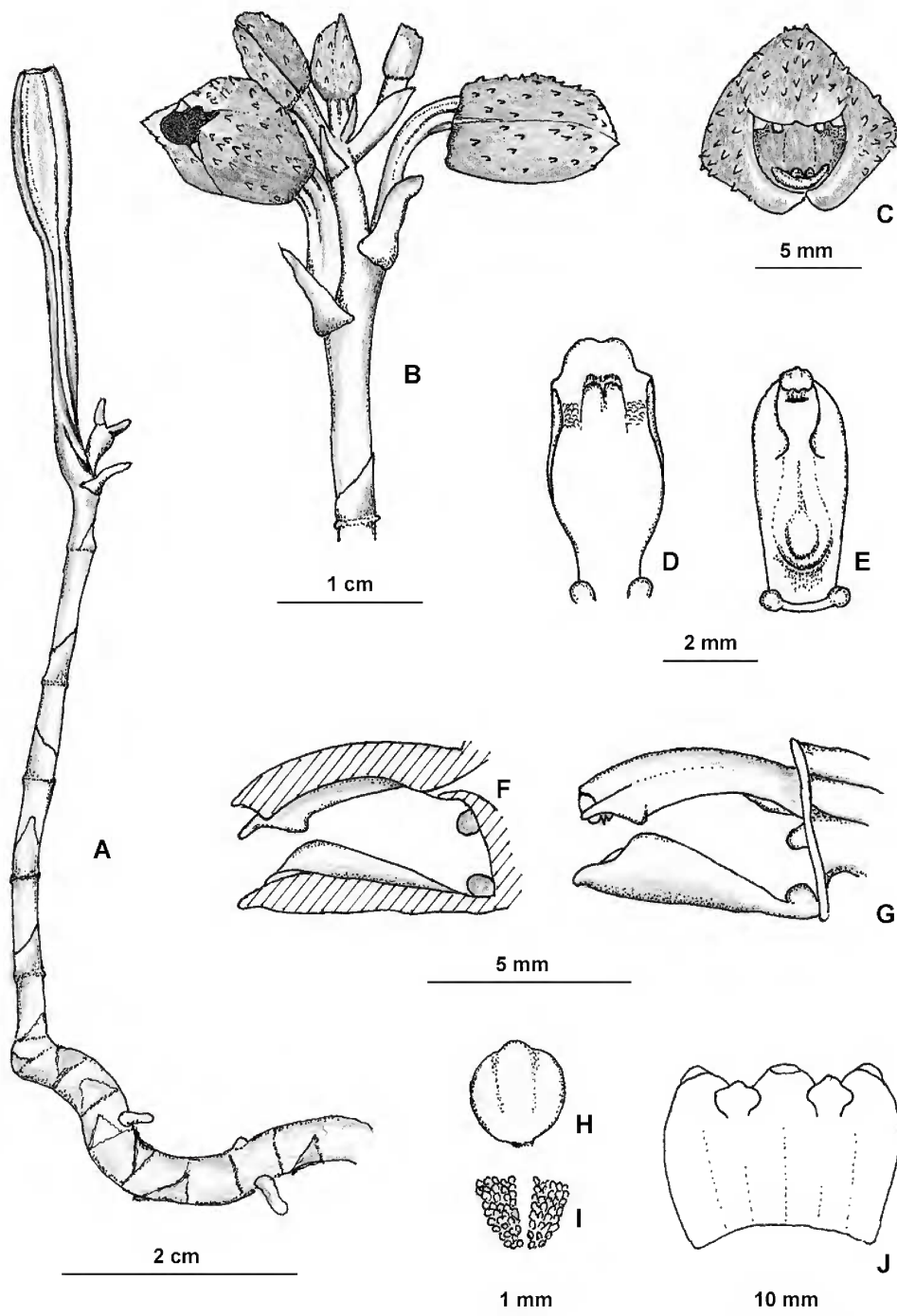


Fig. 1. *Gastrodia umbrosa*. A. fruiting plant. B. close-up of an inflorescence. C. face view of flower. D. face view of labellum. E. face view of column. F. longitudinal section through column and labellum. G. lateral view of column and labellum. H. anther cap. I. pollinia. J. sepals and petals artificially spread open. A from Gray BG9772 (CNS), B–J from Gray *et al.* BG9771 (BRI, CNS). Scale as indicated. Del: B. Gray.



Fig. 2. *Gastrodia umbrosa*. Plant *in situ*. From Gray *et al.* BG9771 (BRI, CNS). Photo: B. Gray.



Fig. 3. *Gastrodia umbrosa*. Close-up view of an open flower. From Gray *et al.* BG9771 (BRI, CNS). Photo: T. Hawkes.

oblong, obtuse, 11–12 × 7–8 mm, connate with lateral sepals for almost their total length, verrucose adaxially. **Lateral sepals** fleshy, oblong obtuse, 11–12 × 6–6.5 mm, connate with each other and dorsal sepal, verrucose adaxially. **Petals** fleshy, ovate to spatulate, *c.* 3 × 3 mm, adnate to the inner surface of the perianth tube. **Labellum** inserted at the apex of the column-foot, free, completely enclosed in the perianth tube, fleshy, green, oblong, canaliculate, broadly acuminate, *c.* 5.5 × 3.5–4 mm, narrowed at the base with two globose processes on the column-foot. **Column** orange, hooded, *c.* 5.3 × 2.5 mm, with two apical stelidia extending forward of the anther, two globose, dark green processes occur on the column-foot at the base of the column. **Fruit** erect, cylindrical, truncate distally and tapered towards the base, creamy brown, 15–16 × 5–6 mm; pedicel elongated, 18–20 mm long. **Figs. 1–5.**



Fig. 4. *Gastrodia umbrosa*. Lateral view of column & labellum. From Gray *et al.* BG9771 (BRI, CNS). Photo: B. Gray.

Additional specimen examined: Queensland. COOK DISTRICT: Atherton, Baldy Mountain Forest Reserve, Feb 2017, Gray BG9772 (CNS).

Distribution and habitat: *Gastrodia umbrosa* is, as yet, known only from a single site in the Baldy Mountain Forest Reserve growing on granitic substrate in submontane rainforest at about 1000 m elevation.

Phenology: Flowering is recorded in February with dehiscence of fruit occurring less than two weeks after flowering.

Notes: Seed pods of *Gastrodia umbrosa* were observed on an elongated upright pedicel that developed rapidly soon after flowering. This post-pollination growth is an adaption in relation to seed dispersal which was well documented and observed in *G. exilis* Hook.f.



Fig. 5. *Gastrodia umbrosa*. Close-up view of column. From Gray *et al.* BG9771 (BRI, CNS). Photo: B. Gray.

in Thailand (Pedersen *et al.* 2004). Upon dehiscence of seed pods, the plant gradually dies back.

Etymology: From Latin, *umbra* (shade), in reference to its preferred habitat under deep shade, in moist and damp forest floor of the submontane rainforest.

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